Remarks

In the Non Final Office Action, the Examiner objected to FIG.2, FIG. 3, FIG. 4, and FIG. 6 under 37 CFR 184(o) because there were no descriptive legends for the boxes. Applicant has included replacement sheets 1, 2, and 3 to correct the drawings in response to the Examiners objections.

The Examiner objected to claims 5, 19, 37, and 38 due to specified informalities. These claims have been amended to overcome these objections.

The Examiner rejected claims 1-14, 15-20, 21-27, 29-34, 35-41, 42, and 43-45 under 35 U.S.C. § 112 second paragraph. More specifically, the Examiner noted insufficient antecedent basis for certain terms used in the independent claims and in some of the dependent claims. Applicant has amended the independent claims and the dependent claims, as necessary, to overcome these objections. Claims were also amended for editorial clarity and to better protect the invention.

The Examiner raised a double patenting rejection and noted that if claim 40 should be found allowable, claim 41 would be objected to under 37 CFR 1.75 as being a substantial duplicate. Applicant has amended claim 41 to overcome this rejection. The amended claim 41 claims identical subject matter recited in the original claim 41 that was included in the original Application filing.

The Examiner rejected Claims 1-13, 15-17, and 19-44 under 35 U.S.C. 102(e) as being anticipated by Roberts et al. (U.S. Pat. No. 6,313,932).

Applicant submits that providing the at least first time-domain portion or the at least second time-domain portion with at least one time offset **equal to at least one signal period** of the at least one repetitive waveform, such as recited in the Independent claims 1, 15, 21, 28, 35, 42, and 43 clearly presents novel structure that the prior-art references neither describe nor anticipate. Thus, the amended independent claims 1, 15, 21, 28, 35, 42, and 43 (and hence, the dependent claims 2-14, 16-20, 22-27, 29-34, 36-41, 44, and 45) should be considered patentable under 35 U.S.C. 102.

Specifically, the claimed invention is directed toward transmitters and associated methods for producing a periodic waveform having a first time-domain portion that is used as a reference signal for demodulating at least a second time-domain portion modulated with data. By providing the first and second time-domain portions with a time offset of at least one period, the invention uses a particularly novel and useful wideband transmission protocol that provides substantial advantages, including improved signal-to-noise ratio, spread spectrum characteristics, and low dynamic range.

Unlike well-known prior-art waveforms that overlap, the claimed invention specifies a time offset of at least one period such that the first and second time-domain portions do not overlap. This avoids uncorrelated noise, and thus, reduces the probability of error in the demodulated signal. This also avoids high dynamic range resulting from constructive interference between overlapping signals, thus, lowering cost and complexity of RF analog components in the transmitter by reducing power amplifier back-off.

None of the prior-art references teach to use a time offset (i.e., delay) of at least one period. Roberts describes a receiver that includes Mach-Zehnder filters tuned to provide delays d_i to d_m to one of first and second arms prior to recombining (col. 11, lines 40-59). These delays d_i to d_m correspond to delays provided to pulses produced by a corresponding modulator. The modulator uses a 1 GHz pulse that is disbursed so as to fill most of a data bit period (col. 12, lines 17-26). As an example, Roberts describes a preferred embodiment in which the data bit period is 1034 ps and the delays range from 517-1033.5 ps (col. 12, lines 27-33). Thus, Roberts describes a system that is similar to prior-art coherence multiplexing techniques in that **delays between a data signal and a reference signal do not exceed a data bit period**. Neither Roberts, nor any other prior-art reference teach to employ a time offset of one period or greater.

It will be appreciated therefore that the schema described by the cited art is not the same as that claimed by the present invention. The present claims are therefore novel.

The Novel Physical Features of the Independent claims provide New and Unexpected Results and Hence Should Be Considered Non-obvious, making the

amended independent claims 1, 15, 21, 28, 35, 42, and 43 (and hence, the dependent claims 2-14, 16-20, 22-27, 29-34, 36-41, 44, and 45) patentable Under 35 U.S.C. 103.

Specifically, by providing the first and second time-domain portions with a time offset (e.g., delay) of at least one period, the claimed invention provides substantial performance advantages over the prior art, making the invention non-obvious, and thus, patentable under 35 U.S.C. 103. In particular, the claimed invention

- avoids uncorrelated noise, and thus, reduces the probability of error in the demodulated signal.
- avoids high dynamic range, thus, lowering cost and complexity of RF analog components in the transmitter by reducing power amplifier back-off.

The Examiner rejected claims 14, 18, and 45 under 35 U.S.C. 103(a) as being anticipated by Roberts in view of Smith (U.S. Pat. No. 4,959,826). Since the independent claims 1, 15, 21, 28, 35, 42, and 43 should be found non-obvious, and thus, patentable under 35 U.S.C. 103, the dependent claims (including claims 14, 18, and 45) should also be patentable under 35 U.S.C. 103(a).

Conclusion

Applicant has amended the claims for editorial clarity and to better protect the invention. Applicants believe these amendments tend to the Examiner's objections and rejections. Applicant respectfully request reconsideration and allowance of claims 1-45. Should any issues remain, the Examiner is encouraged to contact the undersigned agent.

Sincerely,

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